1662

INTERNATIONAL TECHNOLOGY CORPORATION

OPA

Project No. 519063
September 1994

Interim Summary Report No. 2

Product Collection and Treatment System Naples Truck Stop Naples, Utah

Contract No. DACW45-90-D-9002
Delivery Order No. 88

Prepared for:
U.S. Army Corps of Engineers
Rapid Response Group
Omaha, Nebraska

Prepared by:
IT Corporation
Monroeville, Pennsylvania

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

FILE PLAN
99.15.23

OPA

INTERIM SUMMARY REPORT NO. 2

PRODUCT COLLECTION AND TREATMENT SYSTEM
NAPLES TRUCK STOP
NAPLES, UTAH

CONTRACT NO. DACW45-90-D-9002
DELIVERY ORDER NO. 88
IT PROJECT NO. 591063

Prepared by:
IT Corporation
2790 Mosside Boulevard
Monroeville, Pennsylvania 15146

Prepared for:
U.S. Army Corps of Engineers
Omaha District
215 North 17th Street
Omaha, Nebraska 68102

PRPR

Table of Contents

Table of Contents (continued)

List of Figures

1.0 Introduction

IT Corporation (IT) was requested by the U.S. Army Corps of Engineers (USACE) on March 2, 1994 to provide support for an Immediate Response Action at the Naples Truck Stop in Vernal, Utah, under Contract No. DACW45-90-D-9002 and Delivery Order No. 88. The scope of this project consists of the recovery of unleaded gasoline and treatment of impacted groundwater which has leaked from an underground pipeline located on the Naples Truck Stop property, and migrated to the southeast onto adjacent properties. The main focus of the recovery activities will be on the Questar Pipeline Company property. Figure 1 is a site plan of the area affected by this project.

This Interim Report No. 2 details the product recovery and data collection activities accomplished at the site to this point. The supporting data for the initial procedures have been included in Interim Report No. 1. This report will focus on the most recent design activities and projected installation and operation of the recovery and treatment systems.

1.1 Site Background

The Naples Truck Stop is located on U.S. 40 in Vernal, Utah. A release of unleaded gasoline occurred as a result of a ruptured underground supply line from an aboveground storage tank. The quantity of fuel released is unknown. The product migration from the release appears to be in the southeastern direction.

1.2 TAT Data Summary

The Environmental Protection Agency's (EPA) Technical Assistant Team (TAT) conducted the initial investigation to define the extent of contamination and pinpoint the source. Through the use of existing monitoring wells, newly installed monitoring wells, and a geoprobe, the TAT team mapped the extent of the free product and dissolved phase contaminant as of the end of March 1994. Figure 2 shows the approximate location of both plumes and the wells used to define both.

1.3 Recovery Trench

The release has encroached on Questar Pipeline property and was affecting their daily operations. Questar initiated some recovery actions, including the installation of a product recovery trench across their property. The trench was to be used in combination with a biological treatment system for the treatment of recovered product and water. IT was requested by the USACE to provide support for the initial investigation and subsequent removal activities. After IT completed examination of all currently available data, along with newly acquired geologic data for the site, it was evident that the trench would not be adequate in recovering the free product nor preventing its continued migration. A technique called vacuum enhanced pumping (VEP) was recommended as a recovery system because of its proven ability to recover products of this type in similar formations.

1.4 VEP Technology

VEP combines the attributes of vacuum extraction and groundwater withdrawal. The process is able to:

- Recover residual volatile organic compounds (VOC) below the static water table, where vacuum extraction is typically not applicable
- Recover using a single point both floating product and dissolved phase groundwater contamination
- Recover VOCs from within the cone of depression created by pumping of the aquifer, where pump and treat is normally not effective
- Increase the water extraction rates in low permeability settings, thereby increasing the well capture zone
- In certain low permeability settings, eliminate the use of downhole pumps entirely through the use of entrainment extraction
- VEP effectively remediates the "smear" zone by the combined use of vapor and water extraction. The static water table is lowered by water extraction. This exposes the smear zone in the formerly saturated area to the air flow induced by the applied vacuum.

VEP is effective and applicable for this site for the following reasons:

- The site has a limited aquifer thickness where the conventional pump type extraction rate is minimal, due to limited drawdown potential. The use of vacuum withdrawal will significantly increase the water flow rate in the recovery wells, thus expediting recovery time.
- Vacuum extraction will reduce the loading on the groundwater treatment system.

- The VEP system will remediate the fringe and capillary zones once the groundwater table is depressed.

2.0 Interim Recovery/Monitoring Well Installation

Initially, three monitoring wells (MW-11, MW-12, and MW-13) and six recovery wells (RW-1 through RW-6) were installed in the plume area just upgradient of Questar's office building. Figure 3 shows the location of the three monitoring wells and six recovery wells. The monitoring wells were installed for the purpose of collecting data for the aquifer test. The recovery wells were located to optimally capture, as part of an interim VEP capture system, the leading edge and downgradient portions of the plume.

2.1 Monitoring Well Installation/Development Procedures

The monitoring wells are constructed of 2-inch diameter polyvinyl chloride (PVC). The wells were developed by bailing approximately 6 gallons from each monitoring well. Monitoring Wells MW-11 and MW-12 had a substantial amount of silt in the bottom which was removed during bailing. Monitoring Wells MW-11 and MW-12 were bailed continuously without going dry. Monitoring Well MW-13 was bailed dry and required about 20 minutes to recover.

2.2 Recovery Well Installation/Development Procedures

Recovery Well RW-1 is constructed with 6-inch stainless steel. The remaining recovery wells are constructed of 4-inch-diameter PVC. Recovery wells were developed by bailing from 25 to 45 gallons of water from each recovery well. Development water from the wells remained slightly turbid at the end of the development. Recovery Well RW-3 bailed dry and required about 20 minutes to recover. Recovery Well RW-5 bailed down but did not go completely dry. The remaining recovery wells bailed without a measurable drop in the water surface.

3.0 Pilot Test

3.1 Recovery Trench Closure

The recovery trench which traversed the Questar Pipeline property was required to be backfilled to the original ground surface elevation prior to the execution of the VEP pilot test. This trench was about 50 percent installed when the decision was made to abandon this method of extraction. This design called for a trench 10 feet deep by 2 feet wide with a

12-inch-diameter perforated pipe placed along the bottom. The trench was then to be filled with coarse gravel to allow for the influx of groundwater and product. Extraction sumps were also planned for installation at several locations along the trench.

In order to backfill the trench, the existing gravel and pipe were removed using a backhoe and placed in a truck for transport to the soil holding area located in Questar's adjacent pipe storage yard. Once the gravel was removed, the soil originally excavated from the trench was placed back in the trench and compacted with the backhoe bucket. Once the trenches were backfilled to within approximately 3 feet of the surface, road base material was obtained from off-site sources and placed in the trench. This material was well compacted using a plate compactor and leveled with the bottom of the existing asphalt layer.

Due to time constraints, the decision was made to place 6-mil plastic sheeting over the open asphalt areas and cover the entire sheeting with gravel, creating a seal along the edges of the asphalt cuts. This procedure was also followed in several other areas at the site where excavating activities had taken place. This method was designed only as a temporary measure, and the asphalt was restored as soon as possible after completion of the pilot test.

3.2 Initial Groundwater Monitoring

Groundwater level and product thickness measurements were collected from monitoring wells at the site on March 24, 1994. The measurements represent static conditions since they were collected prior to the aquifer or VEP testing activities. Product was detected in Monitoring Wells MW-5 and MW-8. Water table elevations are based on a 100-foot site-specific base line elevation and not mean sea level (msl). Figure 4 shows the water table elevations and groundwater elevation contours. Based on the March 24, 1994 measurements, groundwater flow in the water table is to the southeast.

3.3 VEP Pilot Test

On March 25 and 26, 1994, IT personnel conducted a VEP pilot test on Recovery Well RW-1. The purpose of this test was to assess the aquifer characteristics/soil permeability of the study area, and determine the feasibility of using this particular technology for the recovery of petroleum product as well as long-term restoration of impacted soils and groundwater at the site.

To properly size a vacuum dewatering system, a pilot test is often performed. The following parameters are determined by the pilot test:

- Flow rate verses vacuum for both groundwater and vapor
- Vacuum measured verses radial distance from the extraction well.

The pilot test provided the following data:

- Vapor flow rate from the extraction well or wells
- Vacuum enhanced groundwater yield
- Hydrocarbon concentrations.

This information is then used to determine the size of the vacuum pump required to apply sufficient vacuum on the subsurface, the number and spacing of extraction points, and the size of the vapor and liquid treatment systems, if required.

3.3.1 VEP Pilot Test Procedures

The pilot test was performed on Recovery Well RW-1, which is constructed of 6-inch-diameter stainless steel pipe and extends to a total depth of 17 feet. Monitoring Wells MW-5, MW-8 , MW-11, and MW-12 and Recovery Well RW-2 were utilized as vacuum and groundwater monitoring points. Vacuum readings were collected from these wells using a handheld electronic digital manometer. The test was operated to determine the optimal vacuum and vapor flow rate required to achieve the maximum groundwater and soil vapor recovery rates.

Prior to running the pilot test, groundwater level measurements were collected manually and by pressure transducers. The Hermit 2000B data logger system utilizing five pressure transducers placed in Monitoring Wells MW-5, MW-8, MW-11, MW-12 and Recovery Well RW-2 was set up prior to conduct the test. Manual and transducer groundwater level data were used to determine static conditions. During the VEP pilot test, the Hermit 2000B data logger was programmed to collect data at 15-minute intervals throughout the test. The VEP pilot test was conducted for 24 hours. During the test, manual water level measurements were also collected in Monitoring Well MW-1. These measurements were used to evaluate potential fluctuations in the water table in an area outside the influence of the pilot test.

3.4 Pilot Test Results

Based on review of the data collected during the pilot test, two different conductivity areas exist in the water table at the site. The lowest area of conductivity was measured in the south-southwestern direction from Recovery Well RW-1 to Monitoring Well MW-5. The highest conductivity area was measured in the southeastern direction from Recovery Well RW-1 to Recovery Well RW-2. Hydraulic conductivity values were calculated from the pilot test which shows a K value of 17 feet/day (ft/d) in the low conductivity area and a K value of 39 ft/d in the high conductivity area.

Vacuum effect was only detected in Recovery Well RW-2 as 1.6 inches of water (iw). The remaining four monitoring points did not indicate any detectable vacuum influence. Several reasons exist for the lack of vacuum measured in all radial directions from the extraction well. Monitoring wells screened in the saturated zone only would require groundwater drawdown to be below the top of the screen in order to expose the unsaturated zone to the vacuum. The presence of a higher conductivity area will channel vacuum-effected air flow through the path of least resistance. After review of data collected to date, it appears that a combination of both factors may be affecting the test results. This data do suggest, however, that both groundwater and soil vapor are readily available for extraction purposes.

The pilot system operated for 24 hours and recovered 3,457 gallons of groundwater for an average groundwater flow rate of 2.4 gallons per minute (gpm). Based on this flow rate and groundwater analytical results obtained from the influent to the air stripping system, 0.028 pounds per hour of total benzene, toluene, ethyl benzene, and xylene (BTEX), or gasoline, were removed through the groundwater treatment system. Additionally, two soil vapor samples were collected approximately 12 hours and 23 hours after beginning the test. The two analytical results indicate that between 591 parts per million (ppm) and 630 ppm were extracted through the soil vapor at any given time, for an average of 610 ppm for the entire test. Using a mass balance equation, the average amount of BTEX removed from the air stream during the pilot test equates to 0.190 pounds per hour. An average soil vapor flow rate of 24 standard cubic feet per minute (scfm) was measured throughout the test.

4.0 Interim Recovery System

4.1 Design and Layout

The interim recovery system, which had been installed in March 1994, used the combination of groundwater and soil vapor extraction recovery wells fitted with 1.5-inch-diameter drop tubes inserted to the base of the extraction well screen. A 20-horsepower, oil-sealed, diesel-powered vacuum pump applied approximately 10 inches of mercury to each wellhead to simultaneously remove hydrocarbon-affected water and volatile hydrocarbons as a residuum within the unsaturated soils. Each individual 1.5-inch line leading from the recovery wells to the main influent line is equipped with a gate valve, pressure gauge, and threaded sample port.

The main influent line directs the recovered water and air stream into a water/vapor separator. From the separator, the water is pumped to an oil/water separator tank. Recovered separate-phase hydrocarbons are collected in an aboveground holding tank to await proper disposal. Water containing dissolved hydrocarbons is transported from the oil/water separator into an air stripping system. Finally, treated water is transported to the sanitary sewer for discharge. The vapors separated from the groundwater in the water/vapor separator are routed separately to atmospheric discharge. Figure 5 depicts the interim remedial system process flow.

The hydraulic conductivities utilized in the estimation of flow rates for this interim design are based upon the drawdown data collected in the pilot test. This test was conducted on Recovery Well RW-1. Based upon the results of this test, it appears that Recovery Well RW-1 is located just outside the high conductivity area. This would result in an accurate estimate of hydraulic conductivities in the lower conductivity region but an underestimation of hydraulic conductivities in the channel fill area which is in the higher conductivity area. Therefore, higher recovery rates are to be expected in the higher conductivity areas.

4.2 Setup and Operation

During the first month of initial remedial action, Recovery Wells RW-1, RW-2, RW-3, RW-4, and RW-6 were utilized as extraction wells. Due to changing site conditions and vacuum pump performance, IT personnel turned off Recovery Well RW-6 on May 3, 1994.

Richards Laboratories conducted a limited bioremediation pilot test on May 4, 1994. The water effluent from the vacuum unit was rerouted from the air stripper to the biosystem. At the time of the pilot test, Richards Laboratories was not able to accept the air stream flow into the biosystem. Results from the bio pilot test proved to be inconclusive since Richards Laboratories' equipment could only handle a limited flow rate (approximately 3 to 5 gpm) and the air effluent from the vacuum unit was not discharged into the biosystem. Once the bio pilot test was completed, the water effluent from the vacuum pump was routed back into the air stripper.

On May 11, 1994, the 500-gallon aboveground diesel fuel tank exploded and the vacuum pump caught fire. The remedial system was down until the second week in June 1994, while a new electric powered pump could be acquired. Three-phase, 480-volt and 240-volt power was brought in to supply the energy needed to run the vacuum pump(s). The electric vacuum pump that replaced the diesel unit (System 1) is a 15-horsepower, three-phase, 240-volt, liquid-ring vacuum blower capable of 29 inches of mercury and an air flow rate of 225 scfm. Once the system was restarted, Extraction Wells RW-1 through RW-6 were brought on line.

Figure 6 plots the estimated hydrocarbon removal in both the air and water phases along with the groundwater recovery during the interim recovery period. Groundwater recovery was measured with a totalizing gage. For this reason, per minute flow could be estimated only on the days when the totalizer was read several times a day.

The March data points were taken during the pilot test with only one well pumping. With multiple wells pumping, the groundwater recovery well rate increased (April 4, 1994). On May 5, groundwater and air effluent sampling was conducted. Groundwater recovery rate had dropped off somewhat since the aquifer had become partially dewatered. The recovery system was balanced just prior to the sampling event so its extraction rate was maximized. Total hydrocarbon extraction rate exceeded 32 pounds per day in both the liquid and vapor phases. With continued pumping, the hydrocarbon removal rate dropped off as the flow stream became diluted through the introduction of clean water along the edges of the plume boundary. During the month of July, the vacuum pump began to show a reduced efficiency. Adjustments were made to the system to compensate. This reduction in extraction effectiveness is evident in the groundwater recovery curve in Figure 6. The final biotreatment system test was conducted from August 10 through August 12. After this test, the vacuum pump was dismantled and inspected and exhibited signs of unacceptable wear. The manufacturer indicated that this type of wear was usually caused by chemical etching. To reduce the probability of this problem in the future, an air/water separator tank has been incorporated upgradient of both vacuum pumps to remove the potentially damaging groundwater. A second air/water separator tank downgradient of the vacuum pump will supply the clean water for cooling and sealing in the pump.

5.0 Interim Biological Treatment System

5.1 Design and Operation

Figure 7 shows the layout of the biotreatment system as it was set up for its evaluation. During initial operation of the biotreatment system, the recovery system air effluent was not pumped through it. To guarantee that the minimum contaminant levels for discharge to the publicly owned treatment works (POTW) were met, an air stripper was used as a final treatment step in the overall process.

Initial water quality testing indicated that the biosystem was substantially breaking down the contaminant level in the water. However, because of the clean air being blown through all biotanks for oxygenation, the amount of hydrocarbon loss to the atmosphere was in question.

5.2 Testing and Evaluation

In order to asses the actual contaminant reduction attributed to the biotreatment system itself, a contaminant mass balance was performed. This mass balance included all contaminant mass flows into and out of the treatment system. Before this mass balance was conducted, the contaminated air was introduced into the treatment system as shown in Figure 7. Influent and effluent air and water samples were collected along with a midpoint water sample (just downgradient of the 12,000-gallon tank). This totals to three air and three water samples per sampling event. Due to problems with the recovery system vacuum pump, only one round of samples was collected.

Both air and water samples were analyzed for BTEX. The final water output sample was also analyzed for total petroleum hydrocarbons (TPH) gasoline. The POTW discharge permit allowances are based upon TPH measurements.

Results of this mass balance were as follows:

INPUT TO TREATMENT SYSTEM (first bioprocess tank)
    Total loading from water: 2.26 pounds per day total BTEX
    Total loading from air: 7.00 pounds per day total BTEX

DISCHARGE FROM FIRST TANK
    To air: 2.21 pounds per day total BTEX
    To water effluent: 0.034 pound pe day total BTEX
    Biological Breakdown: 7.11 pounds per day total BTEX

INPUT TO SECOND TANK SERIES (two poly tanks)
    Water input: 0.034 pound per day total BTEX

DISCHARGE FROM SECOND TANK SERIES (two poly tanks)
    To air: 0.0084 pound per day total BTEX
    To water effluent: 0.0000987 pound per day total BTEX
    Biological breakdown: 0.0255 pound per day total BTEX

Overall water and air flow during the test was over 50 percent less than expected because of unexpected wear on the vacuum pump. This reduced the contaminant loading from water by approximately 50 percent. However, when the air flow was higher, the contaminant concentration in the air was about 50 percent less. Therefore, the overall loading of hydrocarbon from the air stream probably was not decreased because of the reduced air flow.

The biological treatment system achieved a 77 percent breakdown of the total BTEX contamination in the flow stream. This level of breakdown could have been increased had the air effluent from the first bioprocess tank (12,000-gallon Black tank) been input to the two poly tanks.

Based on these results and the proposed design of the final biotreatment system, it should be effective enough in reducing contaminant levels for discharge to the POTW and air without the aid of any additional treatment of the water or air flow streams. This is assuming that the bioprocess treatment system maximizes the surface area in all treatment tanks for organism growth.

6.0 Final Recovery System Layout

6.1 Design and Layout

The final recovery system (Figure 8) will consist of two skid mounted vacuum pumps, four air/water separator tanks along with fluid transfer pumps. Several of the recovery wells are located in a high water yielding formation. In order to transfer adequate vacuum energy to the formation to enhance recovery, two recovery vacuum pumps were necessary. Both recovery systems will incorporate two air/water separator tanks, one upgradient and one downgradient of the vacuum pump. This configuration will remove the contaminated groundwater before entering the vacuum pump and use only the clean water from the second tank as cooling and sealing water.

The ten recovery wells will be manifolded into the two recovery units to allow for maximum flexibility in selecting which well is piped through which unit. This will allow for optimizing vacuum distribution based upon water production by each individual well.

6.2 Additional Recovery/Monitoring Wells

Recovery Wells RW-7, RW-8, RW-9, and RW-10 were installed to improve recovery of the contaminated groundwater along with capturing the leading edge of the plume. Monitoring Wells MW-14 and MW-15 were installed to monitor the effectiveness of the recovery system in capturing the leading edge of the plume.

6.2.1 Well Installation

All of the additional monitoring and recovery wells were installed identically. A Dual Wall Hammer Drill Rig was used to bore the wells. All wells were set on the bedrock and screened to within 5 feet of the ground surface. Figures 12 and 13 show a typical cross section for the wells installed.

6.2.2 Well Development

All wells were developed by hand bailing a minimum of 5 well volumes. This amount was bailed because none of the wells cleared up completely, They were bailed until no substantial change in cloudiness was observed between well volumes.

6.3 Piping Installation

The piping for Recovery Wells RW-7, RW-8, RW-9, and RW-10 consisted of a dual containment system. Each well had a 1.5-inch PVC uptake tube extending down into the well connected to a 3-inch PVC pipe returning the flow to the recovery units. All underground piping was secondarily contained within 6-inch and 8-inch diameter Schedule 40 PVC piping. Wells RW-7 and RW-8 are on one line together. Wells RW-9 and RW-10 are also on a line together to the recovery units. Figure 9 shows the piping layout for Monitoring Wells MW-7, MW-8, MW-9, and MW-10.

7.0 Proposed Biological Treatment System

7.1 System Design

Figure 10 shows the proposed layout for the final biological treatment system. The major differences in this system and the interim system are the size of the two secondary tanks, content of all treatment tanks, and the handling of the contaminated air stream. The two secondary tanks are 1,200-gallon steel tanks. The first of these two tanks will be full of a mat matrix to increase the surface area for organisms to grow on. The second of these two tanks will contain carbon as the matrix for organism growth. The 12,000-gallon tank will also be filled with the mat matrix to enhance organism growth. The contaminated recovery system air effluent stream will now be piped in through the bottom of the 12,000-gallon tank for optimum removal of hydrocarbons. From there it will be forced through both of the 1,200-gallon tanks for final removal of contaminants.

7.2 Operation and Monitoring

All recovery system air effluent will pass through the biological treatment system reducing the contaminant concentrations to levels acceptable for direct discharge without additional treatment. Air samples will be collected periodically to monitor the effectiveness of the treatment system and aid in any adjustments in the process flow.

The recovery system water flow will also be monitored to measure the effectiveness of the biological treatment system in removing contaminants. The analytical results will be used to insure that the required contaminant levels for discharge to the POTW are met as well as to make adjustments in the treatment system to optimize operation.

8.0 Integrated Recovery and Biological Treatment System

8.1 Design and Layout

Figure 11 shows the process flow for the final recovery and treatment system. This system will recover and treat both the groundwater and air effluent to meet all POTW and air discharge requirements. The fluid flow between the bio treatment tanks will be gravity flow only. This will eliminate the need for additional failsafes for transfer pumps. The air effluent will be taken from the recovery systems and forced through diffusers in the bio tanks by nonsparking blowers.

8.2 Operation and Integration

The control system for the recovery and treatment systems consists of two control panel assemblies. The control panel skid for the Nepco vacuum extraction systems consists of four control panels that are interconnected and mounted on a common station. Control panel CP-1 contains the controls for the bio treatment system and the autodialer.

The Nepcco control panel contains the following interlocks:

- High and low level switches in the two air/water separator tanks (T-1 and T-3) start and stop the submersible pumps in those tanks (P-1 and P-2).
- High-high level switches in tanks T-1 and T-2 shut down vacuum pumps VP-1 and VP-2, respectively, in the event the water level in the tanks becomes too high. This would indicate a problem with the submersible pump in that tank.
- The high-high and low-low level switches in knock-out tanks T-2 and T-4 shut down vacuum pumps VP-1 and VP-2, respectively, in the event the water level in the tanks becomes too high. This would indicate that the tank needed water or was manually overfilled.

In the event that one of the vacuum blowers shuts down, the submersible pump in the air/water tank will shut itself down when the water level in that tank drops to the low level switch. The corresponding Nepcco panel also sends a signal to CP-1 indicating that the vacuum pump shut down. If either of these signals is received, the autodialer is activated (Alarm Message No. 1).

The effluent tank in the bio treatment system has a high and a low level switch that start and stop the effluent transfer pump. Each of the tanks in the bio treatment system has a high-high level switch that will activate the appropriate alarm light on CP-1 and will send a signal to the Nepcco control panels to shut down both vacuum pumps. This shutdown signal is referred to as the "bio system shutdown contacts." When these contacts are closed for any reason, the autodialer is activated (Alarm Message No. 2). The building sump is equipped with a high-high level switch that activates an alarm light on CP-1 and activates the autodialer (Alarm Message No. 3).

Control panel CP-1 is also set up to accept a set of dry contacts from another source (e.g., an air stripper control panel). This set of contacts will activate Alarm Message No. 4 on the autodialer and can be wired to shut down the vacuum pumps.

9.0 Tentative Completion Schedule

• Shipment of ESVE units	9/27/94
• Mobilization of field crew	10/3/94
• Installation of recovery and treatment equipment	10/4/94 - 10/21/94
• Startup and testing	10/24/94 - 10/28/94
• Operation and maintenance	10/28/94 - 1/28/95

DRAWN BY	R. WEIBLE	04 AUG 94
CHECKED BY	DC	5/22/94
APPROVED BY	TM	9/22/94
DRAWING NUMBER	519063-E2	

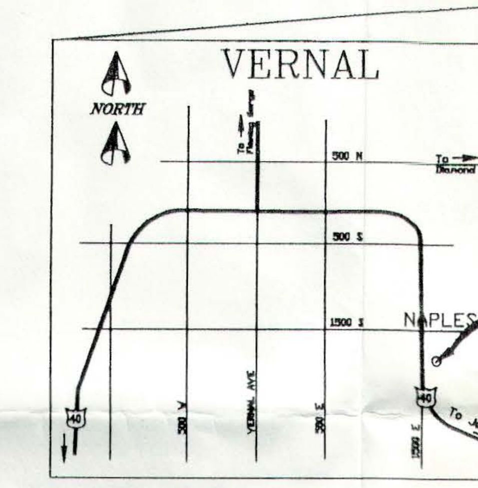
MONITOR WELL TABLE

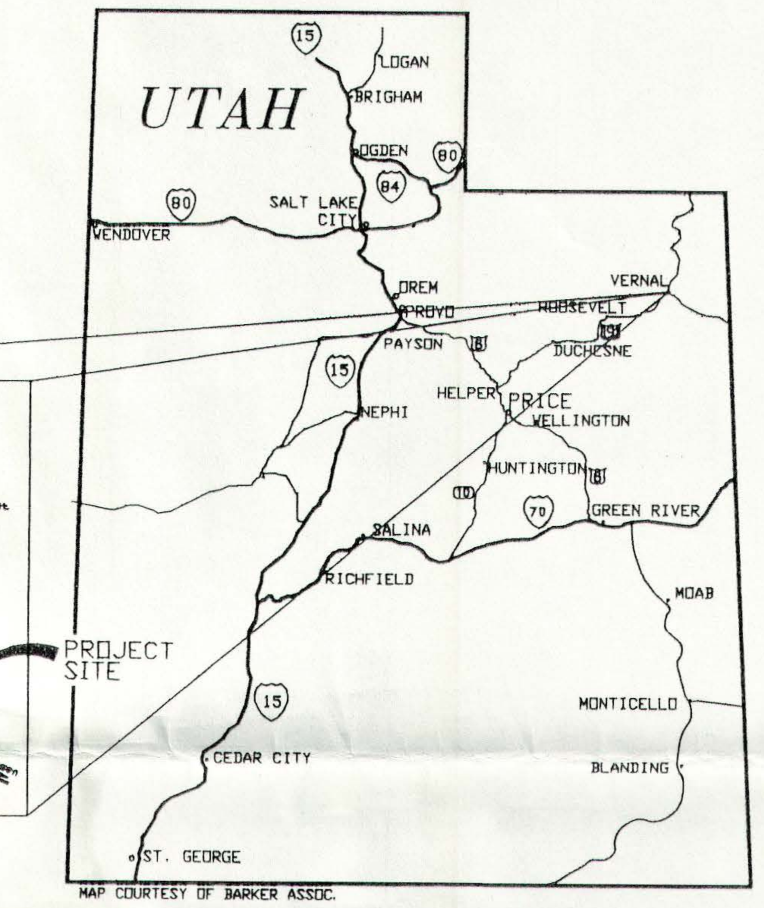
WELL I.D.	ELEV. ON TOP OF WELL	(ELEV. ON CONC.) ELEV. ON CASING	NORTHING	EASTING
C-1	5212.94		771259.86	2558192.84
C-2	5215.38	(5215.19)	771267.18	2557937.99
C-3	5216.39	5216.20	771227.50	2557846.36
MW-2	5208.90	(5208.53)	770853.08	2558240.90
RW-3	5208.97	(5208.09)	770830.11	2558174.64
MW-4	5210.40	5210.25	770891.62	2558135.13
MW-5	5210.69	5210.55	770892.37	2558119.50
MW-6	5210.42	5210.40	770892.18	2558091.66
MW-7	5212.11	(5211.48)	770911.70	2557972.76
MW-8	5212.23	(5211.54)	771002.43	2558051.61
MW-9	5209.77	(5208.98)	771016.36	2558245.33
MW-10	5208.57	(5208.24)	770960.87	2558311.85
NGMW-03	5206.08	(5205.88)	770655.59	2558294.36
NGMW-04	5210.04	(5209.72)	770774.22	2558055.28
T-4	5214.42	5214.35	771020.23	2557867.35
T-5	5214.13	5214.08	771022.13	2557949.50
NGMW-05	5212.91	(5212.54)	770949.03	2557850.50
RW-10	5214.80	5214.62	771088.36	2558014.06
RW-9	5209.77	5214.27	771059.32	2557955.93
MW-13	5208.82	(5208.19)	770785.56	2558211.95
RW-4	5208.10	(5207.17)	770939.43	2558269.52
RW-2	5208.40	(5207.47)	770895.91	2558209.48
RW-1	5209.77	(5209.08)	770945.02	2558130.99
MW-11	5211.57	(5211.38)	770974.28	2558091.26
MW-12	5211.20	(5210.95)	770956.97	2558116.21
MW-13	5210.74	(5210.56)	770937.89	2558140.17
RW-6	5207.77	(5207.13)	770864.60	2558329.58
RW-5	5208.19	(5207.67)	770815.68	2558334.07
MW-14	5204.28	5204.13	770792.58	2558661.70
MW-15	5204.61	5204.42	770885.36	2558655.34
NGMW-01	5206.52	(5206.31)	770953.04	2558468.26
NGMW-02	5207.27	(5206.99)	770727.98	2558456.36
MW-1	5208.17	5208.21	770812.15	2558433.21
RW-8		5207.83	770782.41	2558504.15
NGMW-07		5205.29	770689.00	2558557.97
RW-7		5208.87	770847.75	255843.49

MONUMENT TABLE

MONUMENT I.D.	NORTHING	EASTING	ELEVATION
MON. 1	770908.85	2557855.61	5212.33
MON. 2	770920.60	2558402.90	5207.55

PROJECT LOCATION





LEGEND:

- FIRE HYDRANT
- UTILITY POLE
- FENCE
- BARE GROUND AND GRAVEL
- MONITOR WELL
- PROPERTY LINE
- WATER METER
- WATER VALVE
- MONUMENT SET
- TELEPHONE BOX
- SEWER MANHOLE
- DRAIN

SCALE
0 50 100 150 FEET

FIGURE 1
SITE MAP
NAPLES TRUCK STOP

PREPARED FOR

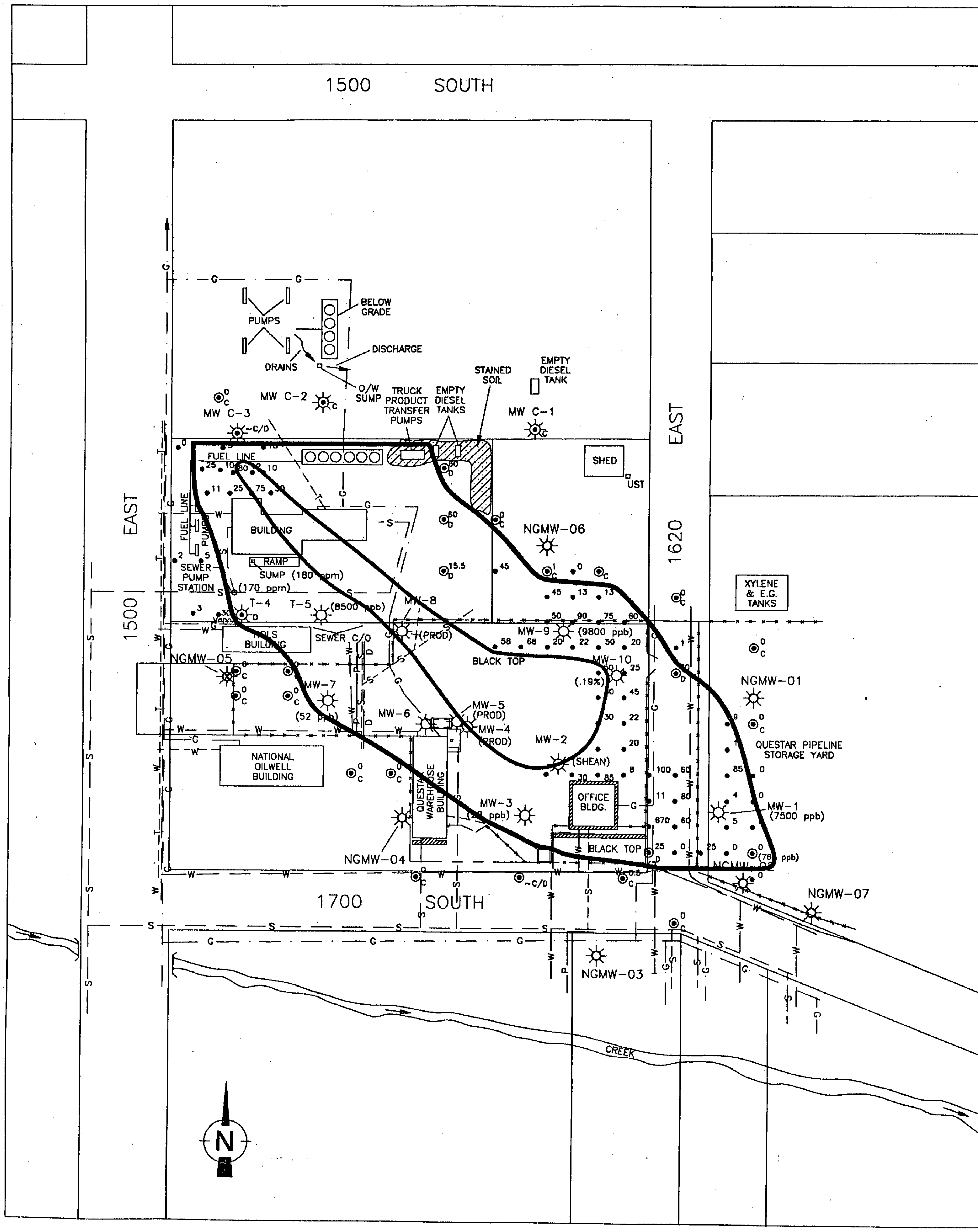
USACOE
OMAHA, NEBRASKA

INTERNATIONAL TECHNOLOGY CORPORATION

"Do Not Scale This Drawing"

REFERENCE:
DRAWING BY ART BARDER & ASSOCIATES
PREPARED FOR INTERNATIONAL TECHNOLOGY CORPORATION.

132298



0 60 120 240 360

SCALE : FEET

LEGEND

S.G. S.G. Soil gas in ppm above background

T.K. T.K. Test kit on water D = Positive for Hydrocarbons
C = Negative for Hydrocarbons

Monitoring well location

Soil gas sample location

Water sample

EPA monitoring well location

Note: Monitoring well data based on 02/15/94 sampling by Questar
Building demensions approximate
Utility locations approximate

BURIED UTILITIES

Water Line	— —W— — —
Sewer Line	— — —S— — — —
Gas Line	— · —G— — · —
Drain Line	———D— ———
Power Line	———P———
Telephone Line	— — — —T— — — —
Property Boundary Lines	——— ———
Perimeter of dissolved phase (Estimated)	
Perimeter of product phase (Estimated)	

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE, REMOVAL AND PREVENTION
EPA CONTRACT 68-W0-0037

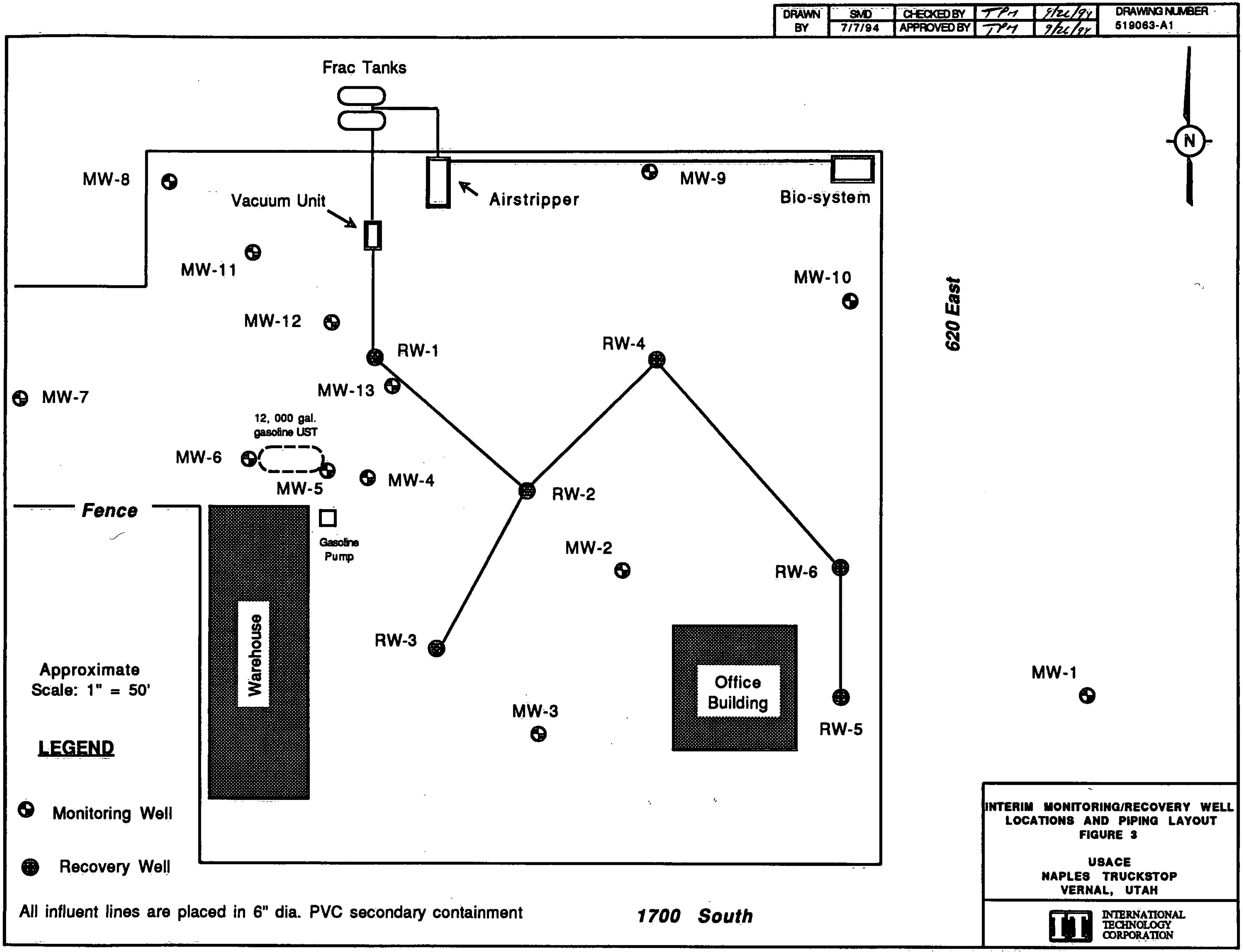
TITLE:
NAPLES GAS
Vernal, Utah
SAMPLE LOCATION MAP

T.D.D. T08-9402-017 ZTNAPLE2

ecology & environment, inc.
DENVER, COLORADO

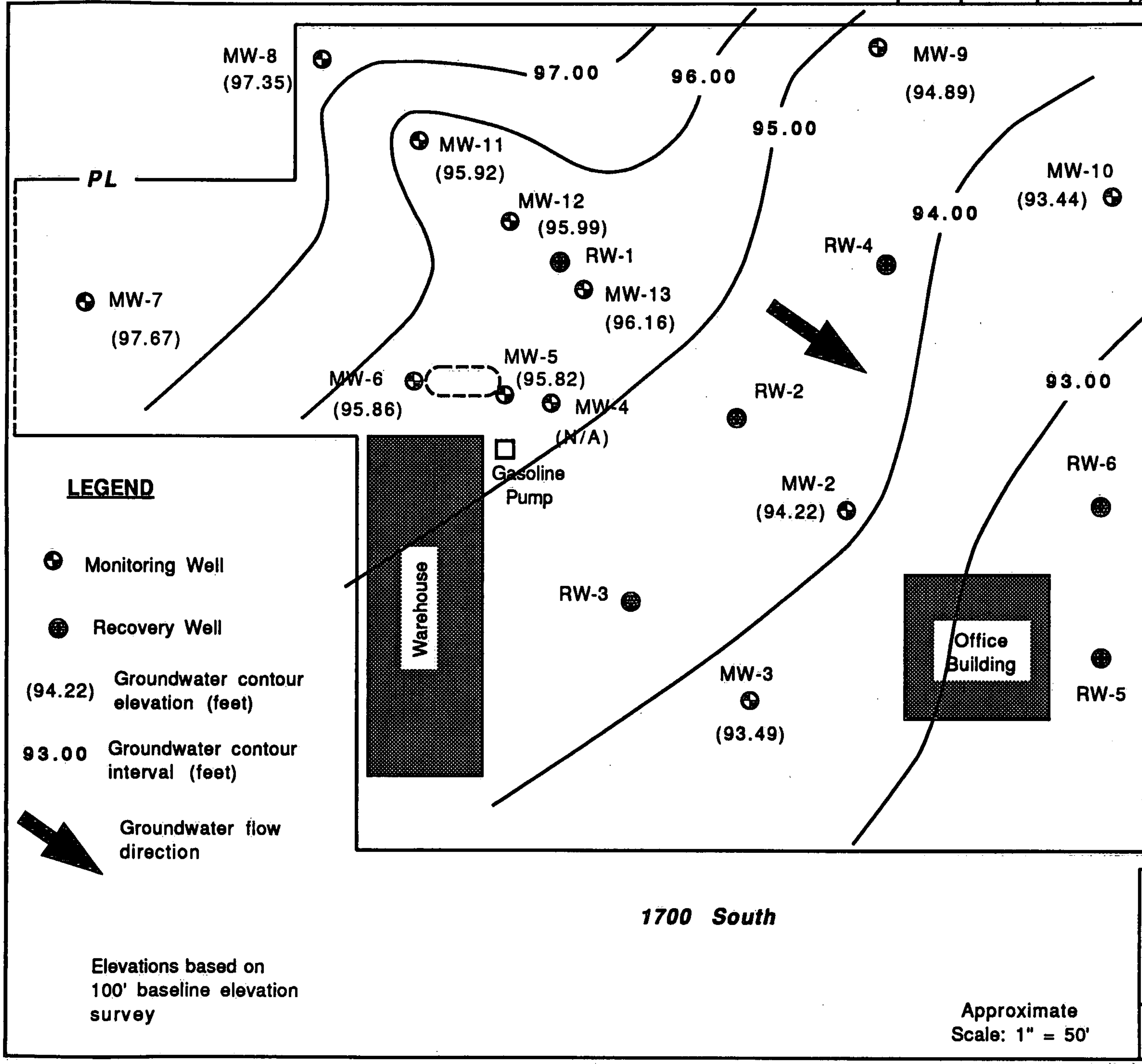
FIG. 2

Date: 03/30/94 Drawn by: RSM Scale: ______



INTERIM MONITORING/RECOVERY WELL LOCATIONS AND PIPING LAYOUT
FIGURE 3

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

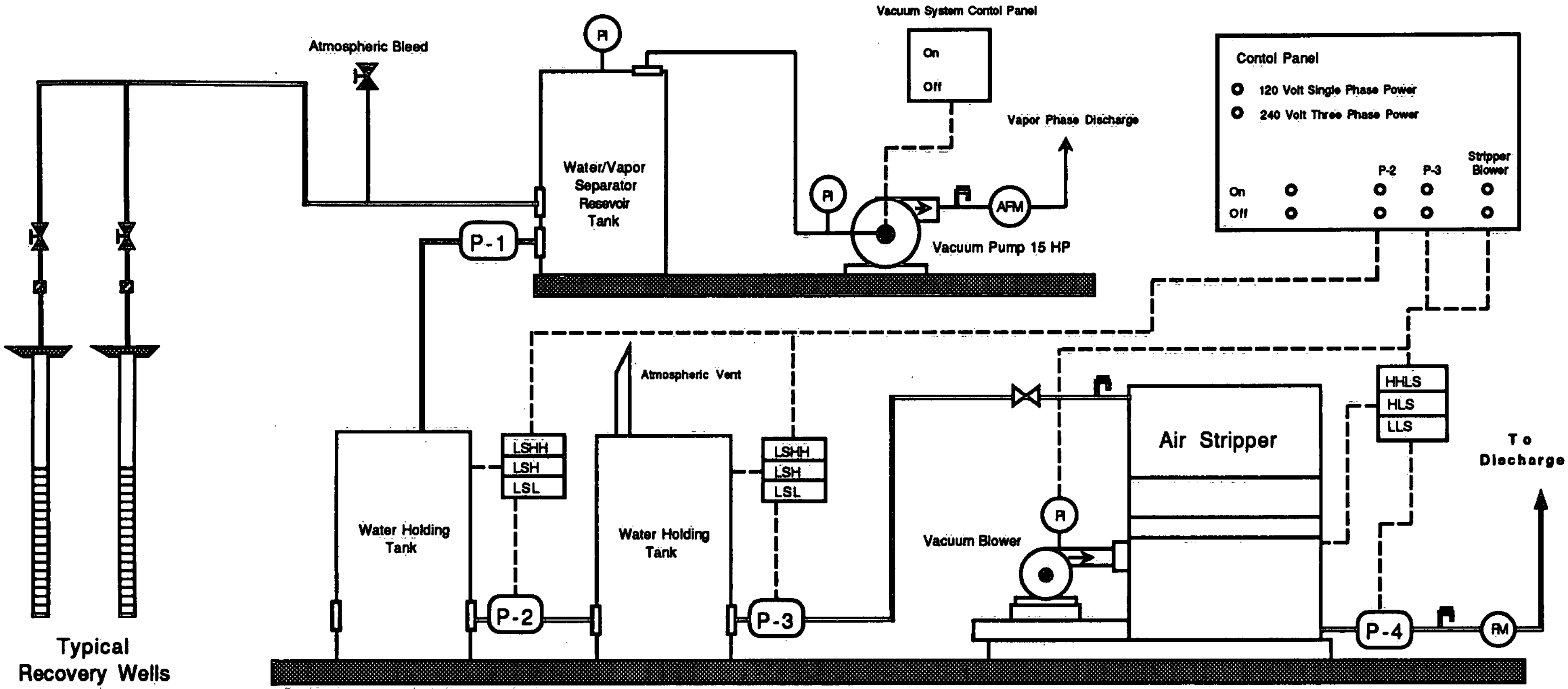


GROUNDWATER ELEVATION CONTOUR MAP
FIGURE 4

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY		CHECKED BY	TPM	9/26/94	DRAWING NUMBER
		APPROVED BY	TPM	9/26/94	



Groundwater Treatment Unit

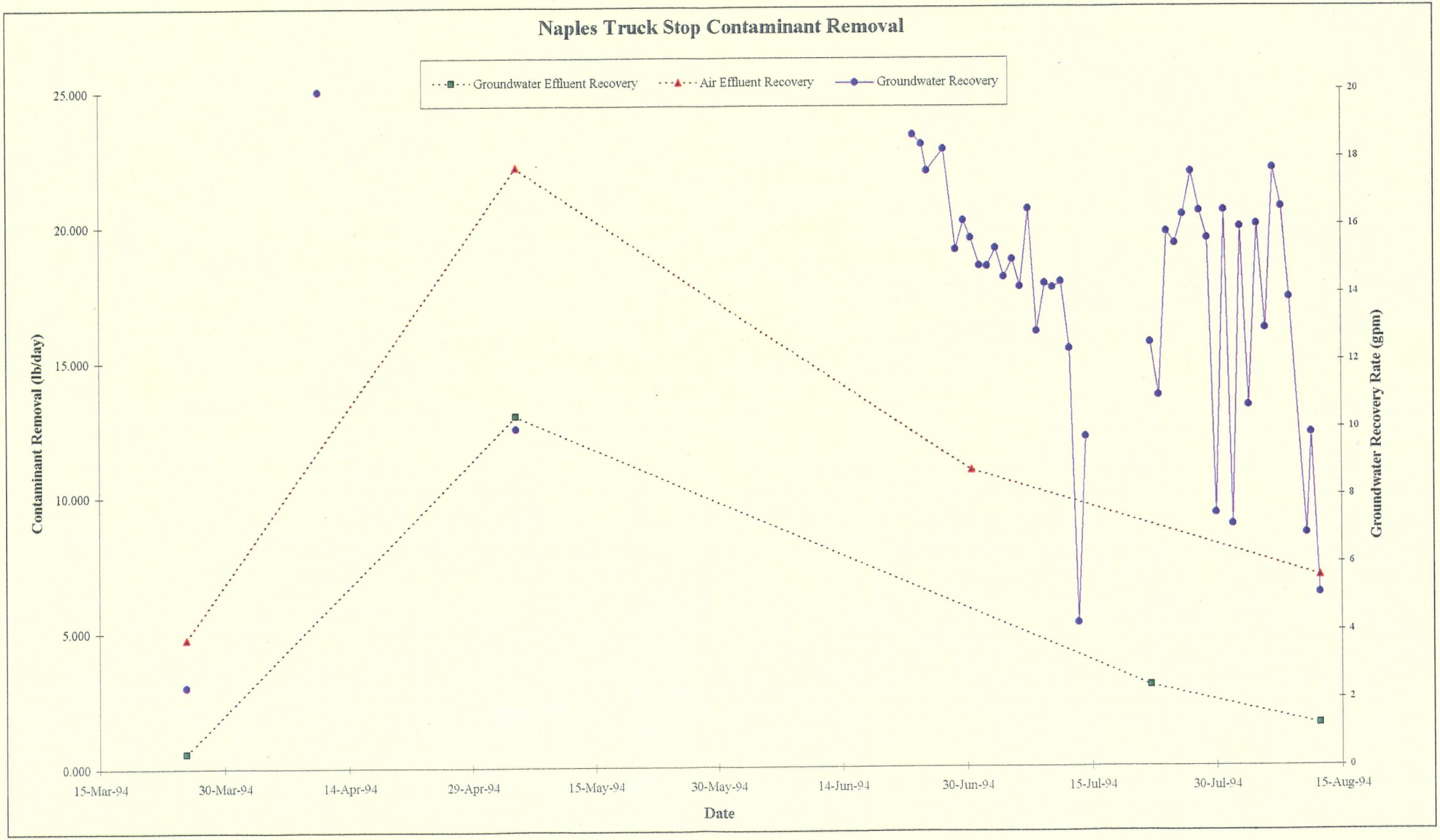
LEGEND:

(sampling port symbol)	Sampling Port	(check valve symbol)	Check Valve	LSHH	Level Switch High High
FM	Flowmeter	(gate valve symbol)	Gate Valve	LSH	Level Switch High
AFM	Air Flow Meter	P-1, 2, 3	Transfer Pump	LSL	Level Switch Low
PI	Pressure Gauge	(hatched square symbol)	Threaded Port to Measure Vacuum Pressure	- - - -	Failsafe Control Cable

INTERIM RECOVERY SYSTEM
PROCESS FLOW DIAGRAM
FIGURE 5

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

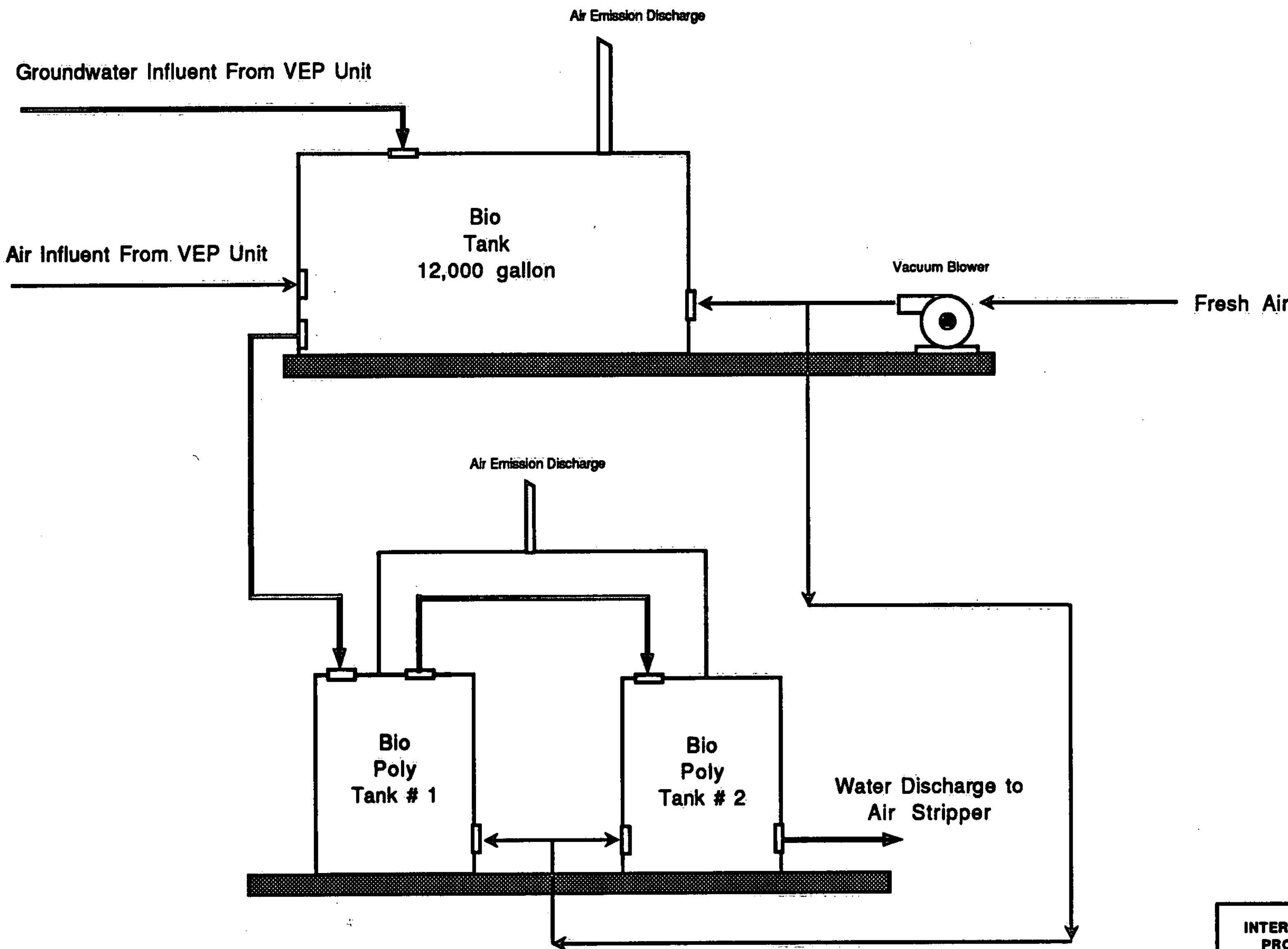
INTERNATIONAL TECHNOLOGY CORPORATION



Naples Truck Stop Contaminant Removal
Groundwater Effluent Recovery
Air Effluent Recovery
Groundwater Recovery
Contaminant Removal (lb/day)
25.000
20.000
15.000
10.000
5.000
0.000
Groundwater Recovery Rate (gpm)
20
18
16
14
12
10
8
6
4
2
0
15-Mar-94
30-Mar-94
14-Apr-94
29-Apr-94
15-May-94
30-May-94
14-Jun-94
30-Jun-94
15-Jul-94
30-Jul-94
15-Aug-94
Date

FIGURE 6

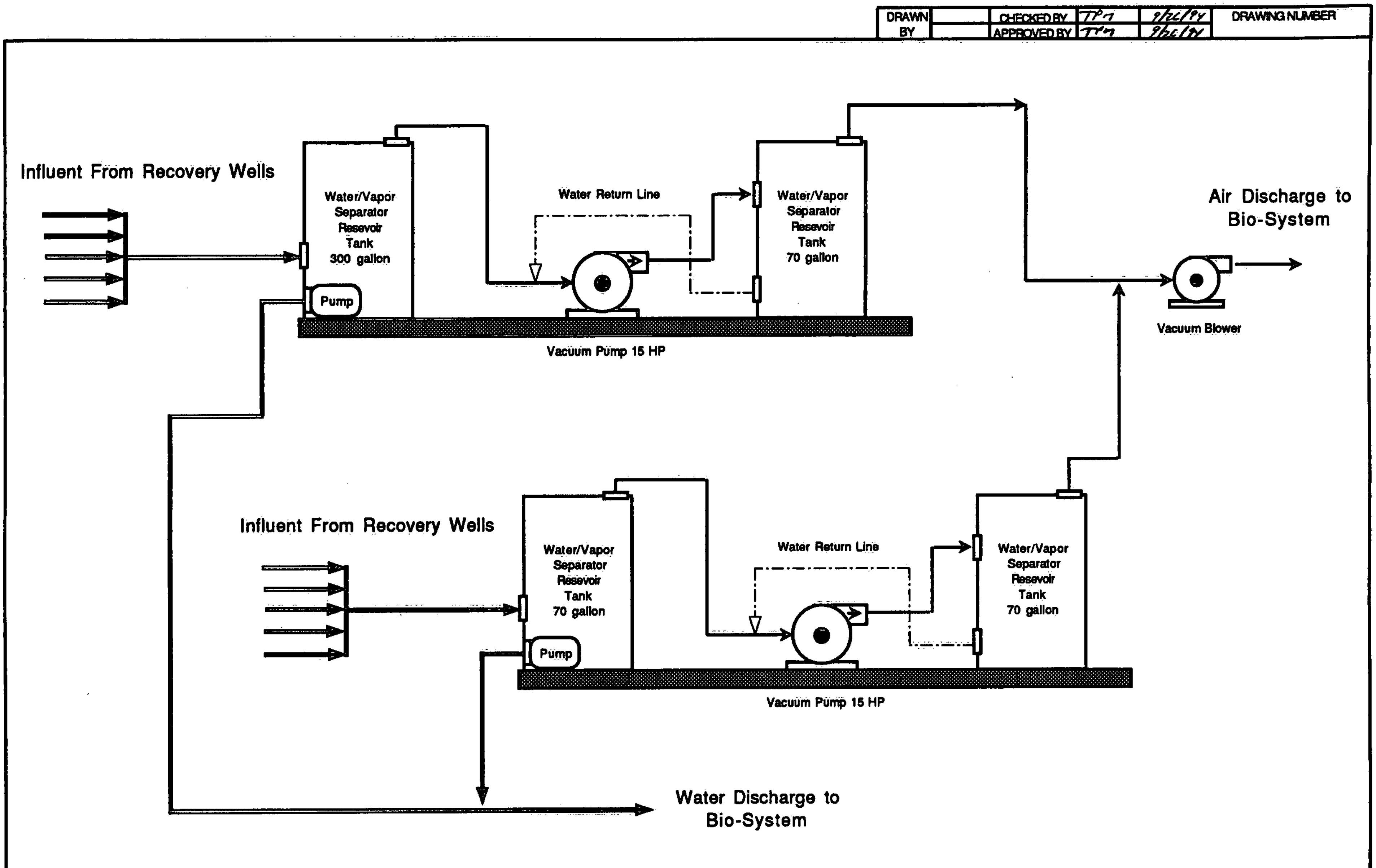
DRAWN BY		CHECKED BY	TPM	9/26/94	DRAWING NUMBER
		APPROVED BY	TPM	9/26/94	



INTERIM BIOLOGICAL SYSTEM
PROCESS FLOW DIAGRAM
FIGURE 7

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

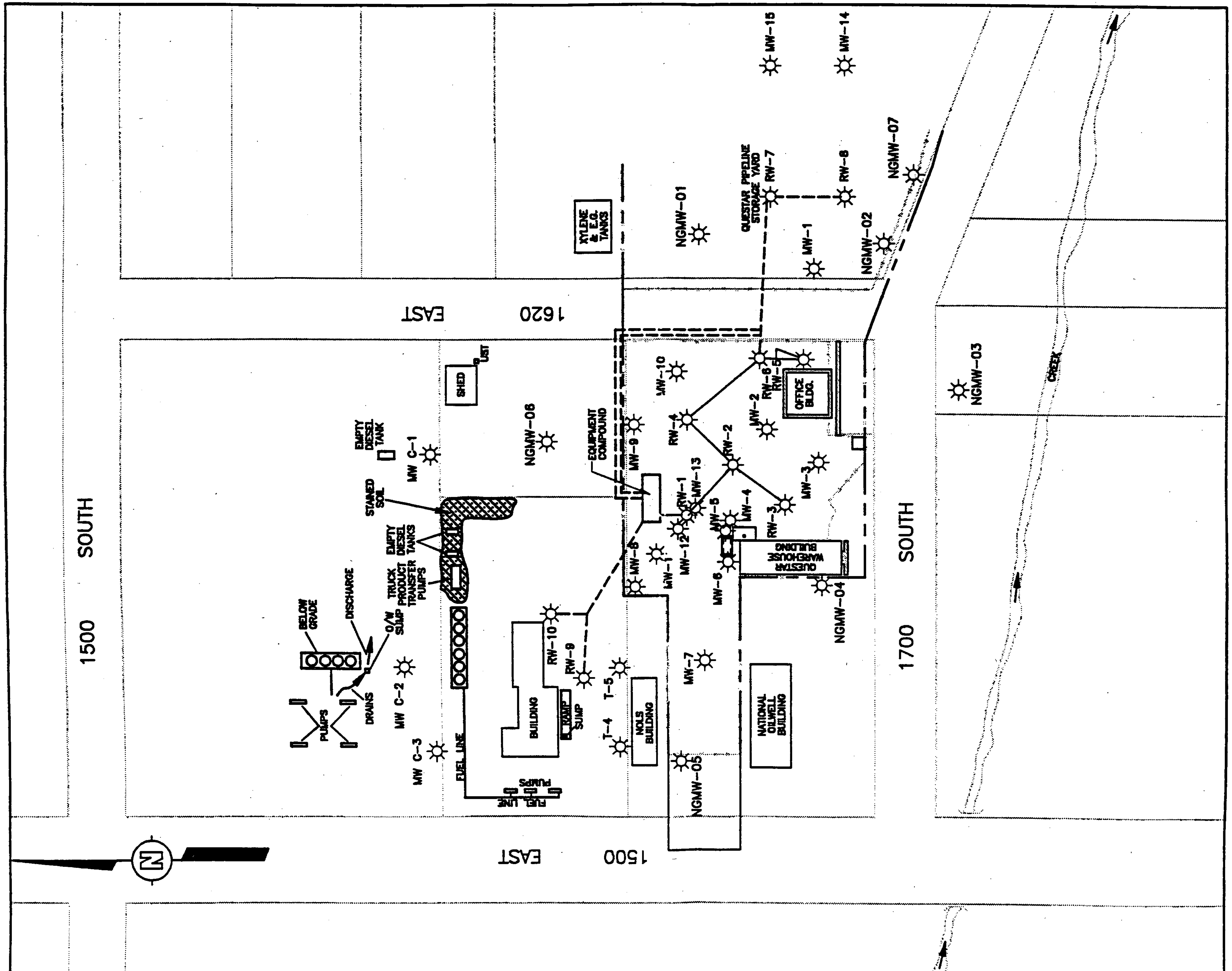
INTERNATIONAL TECHNOLOGY CORPORATION



FINAL RECOVERY SYSTEM PROCESS FLOW DIAGRAM
FIGURE 8

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION



DRAWN BY	JES 07-26-94	CHECKED BY	TPM 7/26/94	DRAWING NUMBER	519063-B2
		APPROVED BY	TPM 7/26/94		

LEGEND

- MONITORING WELL LOCATIONS
- RECOVERY WELL LOCATIONS
- EXISTING PIPING
- PROPOSED PIPING
- PROPERTY BOUNDARY LINES

SCALE

0 120 240 FEET

FIGURE 9

FINAL RECOVERY SYSTEM LAYOUT

NAPLES TRUCK STOP

PREPARED FOR

USACOE
OMAHA, NEBRASKA

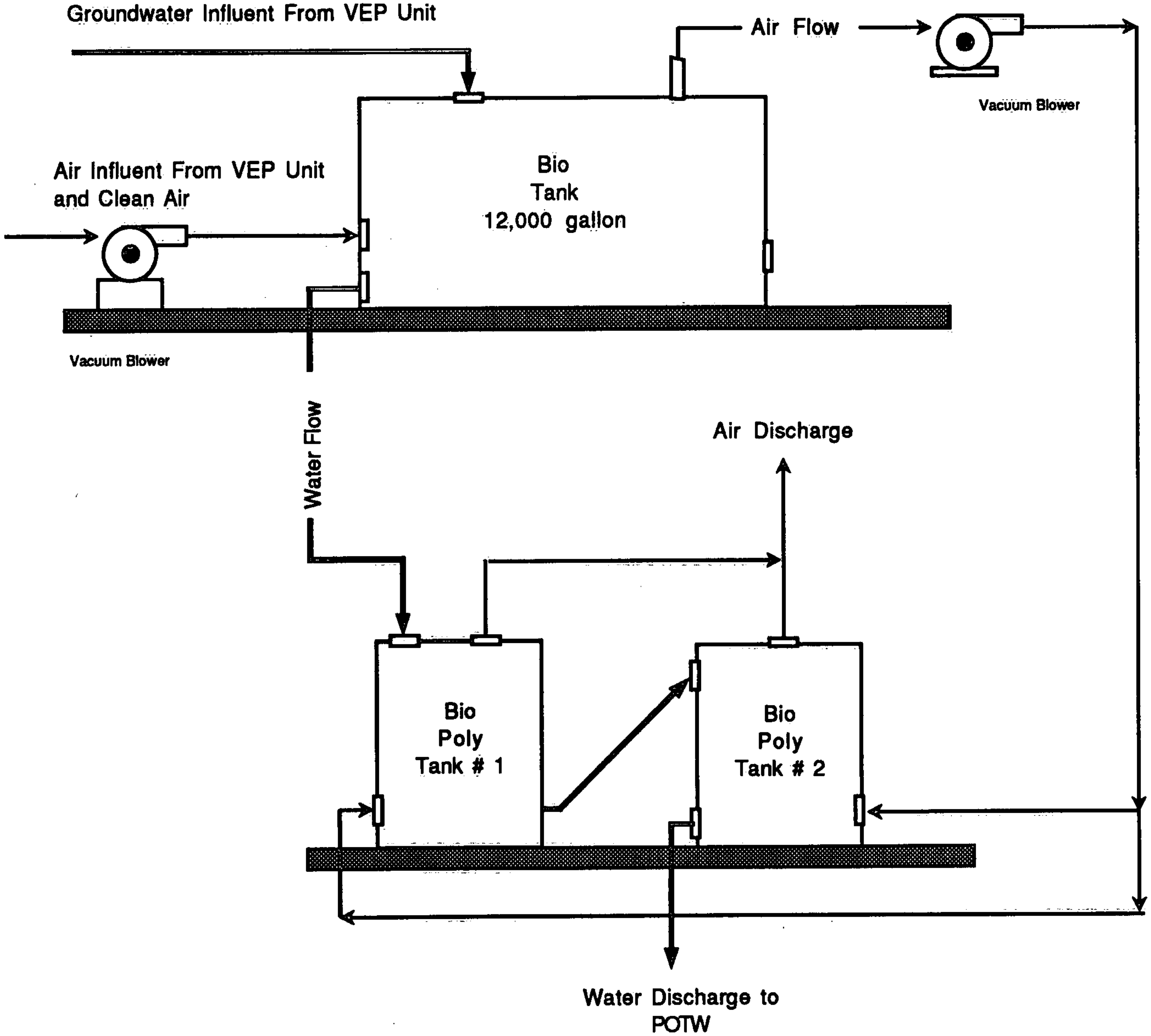
INTERNATIONAL TECHNOLOGY CORPORATION

"Do Not Scale This Drawing"

132298

07-27-94 1:40 PM

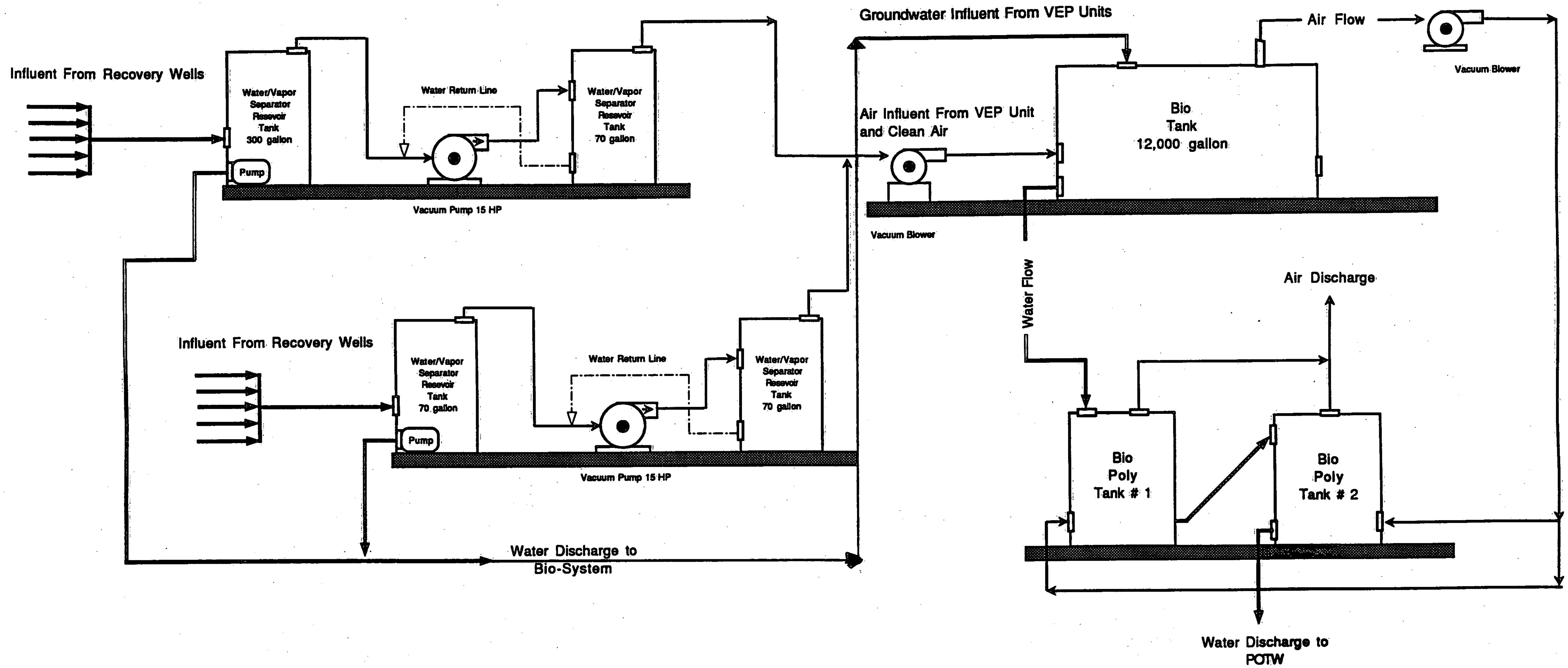
DRAWN BY		CHECKED BY	TPM	9/26/94	DRAWING NUMBER
		APPROVED BY	TPM	9/26/94	



FINAL BIOLOGICAL SYSTEM PROCESS FLOW DIAGRAM
FIGURE 10

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

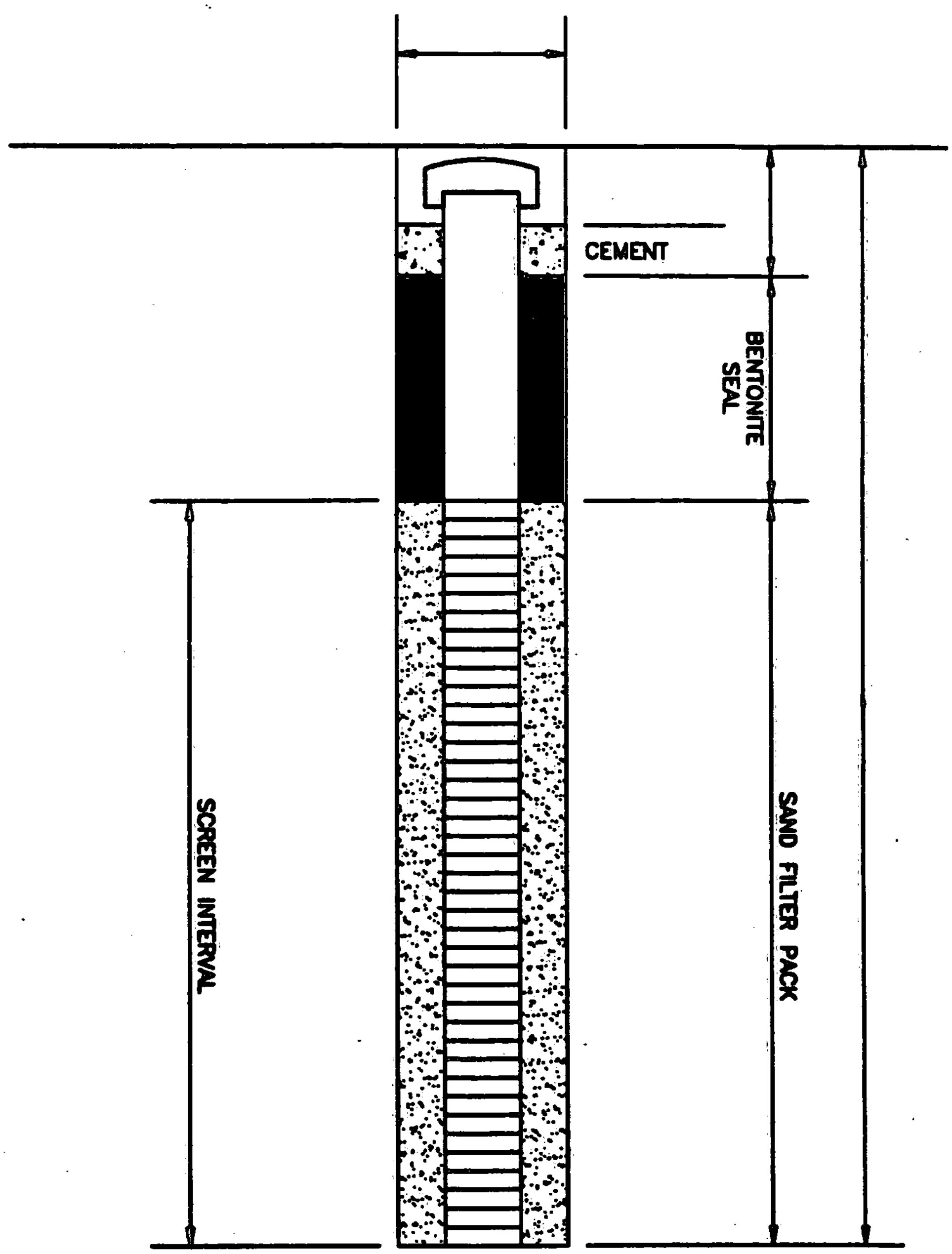
INTERNATIONAL TECHNOLOGY CORPORATION



INTEGRATED RECOVERY SYSTEM
AND TREATMENT SYSTEM
PROCESS FLOW DIAGRAM
FIGURE 11

USACE
NAPLES TRUCKSTOP
VERNAL, UTAH

INTERNATIONAL
TECHNOLOGY
CORPORATION



DRAWN BY C.J.B. 04-20-94 | CHECKED BY | APPROVED BY | DRAWING NUMBER 519063-A6

WELL DIAGRAM FOR TYPICAL PVC WELL

NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

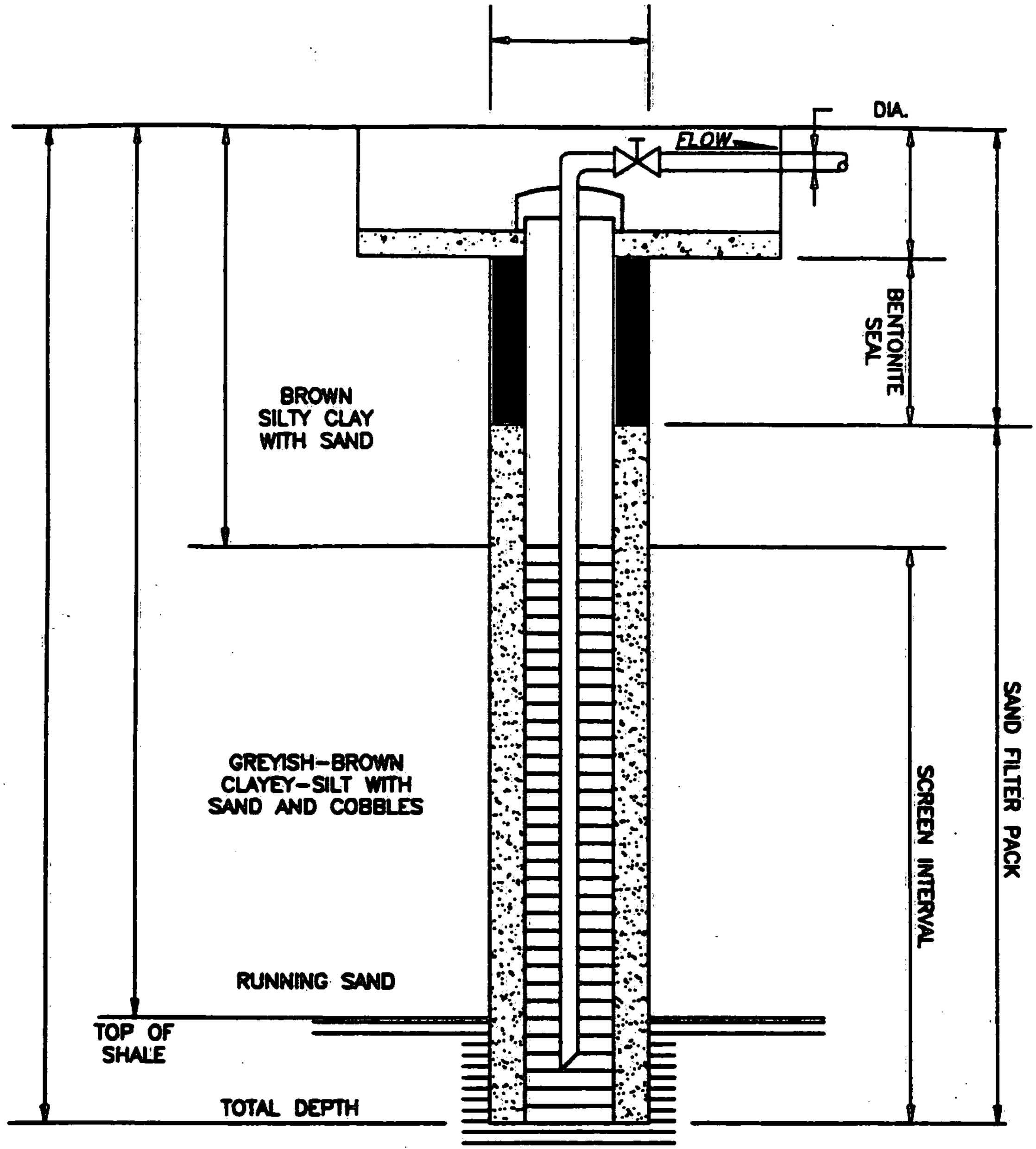
ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

Figure 12

DRAWING NUMBER 519063-A4

DRAWN BY	C.J.B.	04-20-94
CHECKED BY	TPM	9/26/94
APPROVED BY	TPM	9/26/94



NOTE:

WELL SCREEN IS 4" PVC 20 SLOT.

WELL DIAGRAM FOR 4" PVC WELL RECOVERY WELL

NAPLES TRUCK STOP
VERNAL, UTAH

PREPARED FOR

ACOG
VERNAL, UTAH

INTERNATIONAL TECHNOLOGY CORPORATION

132238

Figure 13